

that the predaceous fishes might confound it with the sea-weed, and therefore not exterminate it"\*.—*Proc. Acad. Nat. Sci. Philad.* Nov. 5, 1889, p. 344.

*On Seasonal Dimorphism in Japanese Butterflies.*

By DR. ADOLF FRITZE.

Besides the nine Butterflies cited by Pryer † as seasonally dimorphous in Japan, namely *Papilio machaon*, L., *P. xuthus*, L., *P. macilentus*, Janson, *Pieris napi*, L., *Colias hyale*, L., *Terias multiformis*, Pryer, *Vanessa C-album*, L., *V. C-aureum*, L., and *Polyommatus phleas*, L., two new ones occur, according to my investigations in the interior of central Japan in the summer of 1889, namely *Thecla arata*, Brem., and *Vanessa levana*, L.

*Thecla arata*, Brem., which has hitherto been regarded as single-brooded, has two generations which are markedly seasonally dimorphous, and this seasonal dimorphism shows itself especially upon the underside, while the upperside of both generations is uniformly blue; only the blue of the summer form is darker than that of the winter form. In the latter the ground-colour of the underside is dark greyish green, interrupted by three white bands of different breadth, to which are added on the hind wings several smaller white streaks. The lower angle of the hind wings is orange-red, with four black spots, the two upper ones having a bluish-white nucleus. It is this generation that Pryer has figured. It flies in May and June.

The summer generation, which flies in August, shows on the underside exactly the pattern of the spring generation, but instead of the greyish-green coloration we have here a dark brown, and in place of the white bands and streaks we find light brown ones; the orange-red of the angle of the hind wings is much less intense, and the bluish-white nuclei in the black spots disappear entirely or almost entirely.

*Vanessa levana*, L.—The seasonal dimorphism of the European form of this species has long been known; it occurs also in the Japanese form, although here other and very remarkable characters occur. Thus, while the summer generation, the so-called *prorsa* form, which flies in August, is exactly like the German form, the German spring generation, the *levana* form, is entirely wanting in central Japan. In its place appears a *prorima* form, which has a rather close resemblance to the form figured by Weismann in his 'Studien zur Descendenztheorie' pl. i. fig. 2. From this the Japanese *prorima* is distinguished chiefly by the greater prominence of the black spots and bands, by several brown spots at the root of the fore wings, and by a straight light brown transverse band upon the hind wings. This generation flies in May and June, and has hitherto been regarded as a distinct species, *Vanessa burejana*, Brem.—*Zool. Anzeiger*, January 13, 1890, p. 12.

\* Peter Osbeck, Reise nach Ostindien und China. Aus dem schwedischen übersetzt von J. G. Georgi; Rostock, 1765, p. 400.

† Pryer, 'Rhopalocera Niponica.—A description of the Butterflies of Japan,' Yokohama, 1886 and 1888.